Addendum A to the *Work Plan for the Characterization of Groundwater Brine Zones for Interim Remediation Activities at the Moab, Utah, UMTRA Project Site, February 2002* (GJO–MOA 1.9–2)

I. Introduction

Results from field tests conducted in March 2002 are presented in the *Characterization of Groundwater Brine Zones at the Moab Project Site (Phase I),* June 2002. These results suggest that the design of the pumping well used to conduct the tests, which was screened from the upper fresh water (less than 5,000 mg/L total dissolved solids [TDS]) zone to the lower brine unit, prevented from reaching a definitive conclusion regarding the relationship between draw down in a remediation extraction well and upwelling in the underlying brine zone. For this reason, additional testing conducted with a well screened only in the upper fresh water zone is required to determine the maximum pumping rate that can be sustained without any rise in the underlying brine zone. This addendum outlines a long-term field test (Phase II) that will be conducted. Data collected from a long-term test is required to support the design of an interim remedial action to reduce risk to endangered fish from ammonia discharge to the river.

Two tests are outlined in this addendum. One test will be conducted at a relatively low flow (1 to 5 gpm) and the other test at a relatively high flow (greater than 5 gpm). The low flow test will be performed using an existing well to save costs and expedite the schedule. Results from the first test will be used to decide if new pumping and observations wells, and additional testing at a higher flow rate, are required.

Task 1—Test Conducted with Existing Pumping Well

Scope

Existing well PZ1S appears to be the best candidate for use as a pumping well for a long-term test because it is screened exclusively in the silty sand portion of the aquifer (from 14 to 19 feet [ft] below ground surface [bgs]). However, because of the well construction (2 in diameter well with a 5 ft screen) and a limited saturated thickness (approximately 5 ft) there is a question whether a sustainable pumping rate between 1 and 5 gpm can be achieved. Therefore, a step test will be conducted to determine the maximum sustainable pumping rate. If a sustainable flow rate (1 to 5 gpm) can be maintained, then an observation well will be installed within 20 ft of PZ1S using the Geoprobe and the long-term test will be initiated. However, if the results from the step test indicate that a minimal sustainable pumping rate cannot be achieved from the existing well, then a new pumping well and observation well will be installed (see Task 2).

Task 2—Test Conducted with New Pumping Well

Scope

In the event that existing PZ1S well does not provide a minimal sustainable pumping rate of 1 to 5 gpm, or if the results of the low-flow rate test are inconclusive, it will be necessary to install a new pumping and observation well. The results of the low-flow rate test may be inconclusive if the aquifer is not stressed sufficiently to observe a drawdown response in the observation wells or if no brine upwelling is observed. The locations, depths, and construction details for the proposed wells are described below.

Location of New Wells

An optimal location to install a new pumping and observation well is in the vicinity of the PW01 cluster. This location is optimal for a number of reasons. First of all, baseline samples representative of static conditions were collected at this location as part of the groundwater chemistry characterization completed during the Phase I field activities (DOE 2002). Specific conductance, density, ammonia (as N), chloride, sulfate, TDS, and uranium data were measured from numerous groundwater samples collected as a function of depth. This baseline characterization data can be compared to the chemistry results associated with the long-term test.

Another reason is because the subsurface conditions are well known based on the installation of the PW01 cluster wells by SMI. All boring logs are included in Appendix A of the Work Plan (DOE 2002).

One last advantage of installing the new wells in the vicinity of the PW01 cluster is the availability of using the PW01 wells as observation wells during the test. Wells previously installed at the PW01 cluster are screened at various intervals; the shallow zone observation well PZ1S is screened from 14 to 19 ft bgs, the middle zone observation well PZ1M is screened from 55 to 60 ft bgs, and the deep zone observation well PZ1D is screened from 70 to 75 ft bgs. Using these previously installed wells as observation wells will reduce the cost and schedule of installing additional wells for the long-term test.

Installing the pumping well in the middle of the PW01 cluster will provide the most effective means for configuring the long-term test. Ideally, the pumping well will be installed approximately 10 ft from PZ1S, PZ1M, and PZ1D. The observation well will be installed approximately 20 ft north of the new pumping well.

Pumping Well

Completion Depth—The boring logs indicate the sandy gravel portion of the aquifer (which is more conductive compared to the shallow silty sand portion), is first encountered at approximately 33 ft bgs. At this depth a 10 ft thick clayey gravelly sand unit (which contains up to 20 percent clay) overlies the sandy gravel. The new pumping well will be completed in this clayey gravelly sand unit, down to a depth of 28 ft bgs. At this depth, the bottom of the screen for the pumping well will be 5 ft above the conductive sandy gravel unit. A 5 ft buffer between the bottom of the screen interval and the top of the sandy gravel should be sufficient to reduce potential groundwater flow into the well from the underlying unit, as explained in the Phase I report (DOE 2002). However, completing the well in a finer-grained unit will also tend to limit groundwater flow from the underlying unit.

Well Construction—In order to allow more flexibility regarding potential pumps to be used during the long-term test and any subsequent use of the well, the pumping well will be constructed using a 12 inch diameter bore hole and 6 inch schedule 40 PVC casing with a 15-ft well screen (0.020 inch slots) installed from 13 to 28 ft bgs. In this manner, the top of the well screen will be approximately at the seasonal low groundwater elevation. A coarse filter pack (10/20 silica sand) will be installed from the bottom of the well to 3-ft above the top of the screen. A 3-ft fine filter pack (20/40 silica sand) will be placed above the coarse filter pack. A

5-ft thick bentonite seal will be installed above the fine filter pack and then grouted to the surface.

Observation Well

Completion Depth – In order to obtain the most useful information, an observation well completed in the shallow silty sand portion of the aquifer needs to be installed. This well will be installed at a depth of 28 ft bgs, similar to the pumping well.

Well Construction – The observation well will be constructed using an 8-inch diameter borehole and 2-inch diameter schedule 40 PVC casing with a 15-ft screen (0.020 inch slots) installed from 13 to 28 ft bgs. Filter packs, bentonite seal, and the grout completion will be installed the same as for the pumping well.

II. Procedures

Step-Test

The Task 1 step test will consist of pumping water from well PZ1S at three different pumping rates, with each step lasting one to two hours. Each subsequent step will be conducted at a higher flow rate after the initial step has been completed. Actual flow rates for the step tests will be determined in the field.

All water level data will be collected by hand and using data loggers equipped with pressure transducers. Water level data will be collected during the step test from the pumping well and each of the observation wells.

Long-Term Test

Prior to the start of the long-term test, groundwater samples will be collected from the middle of the screen interval from each of the observation wells and from the same depth the pump intake will be set in the pumping well. These samples will be collected in the same manner as described in the work plan (DOE 2002), and analyzed for specific conductance, density, TDS, ammonia (as N), sulfate, chloride, and uranium.

Groundwater samples will also be collected within the first half-hour after the test has been started, and at various times over the course of the test. The conductivity, pH, and temperature will be monitored in the field using Troll 8000 probes.

All water level data will be measured by hand and recorded by data loggers connected to pressure transducers.

III. Regulatory Compliance

The following key regulatory drivers were determined to be applicable to the proposed scope of work.

National Environmental Policy Act—The proposed activities are addressed in the Environmental Checklist (GJP 01–02) recommending categorical exclusion, which was approved by the DOE on November 8, 2001. All proposed activities are within the site boundary and fall within the proposed actions listed in the environmental checklist that includes:

> *"Radiological and chemical sampling and analysis of surface and near-surface soils, surface water and ground water in disturbed areas where threatened or endangered species will not be adversely affected. This includes existing and new wells, boreholes, and test pits."*

National Historic Preservation Act—At the time the site was initially disturbed (1950s) the land was in private ownership and not subject to the National Historic Preservation Act (NHPA), which was enacted at a later date. There is no evidence, including the Environmental Impact Statement (EIS), that NHPA investigations and surveys were conducted within the site boundaries. However, the majority of the site surface is significantly disturbed, so further investigation at this time appears unnecessary. In addition, a letter dated September 19, 1994 from the Utah Division of State History (Appendix H, EIS), which concurs with EIS proposed on-site disturbances and reclamation. The degree of disturbance under this work plan is less than the degree of disturbance proposed in the EIS (NRC 1999). A survey conducted by Montgomery Archeologists, for portions of the millsite in June 2002, has revealed that a historic site on National Park Service lands north of the highway (T25S, R21E, Section 27, NW4) may extend onto the millsite. No work is proposed north of the road. Montgomery Archeologists has notified MACTEC–ERS that the exact location is confidential and not available for public information for site protection purposes. However, if any work north of the highway becomes necessary, it will require clearance through the contractor (MACTEC–ERS) and DOE cultural resources staff. The final report from Montgomery Archeologist is expected the week of June 10, 2002.

Threatened/Endangered Species—DOE has conducted informal consultation routinely with the U.S. Fish and Wildlife Service (USFWS). The USFWS has requested further consultation if activities may occur within potentially suitable southwest willow flycatcher habitat. Tamarisk near the area where the long-term pump test is planned may meet criteria as potentially suitable habitat for the southwest willow flycatcher. However, there will be no tamarisk disturbance or removal involved with the long-term pump test. If it is determined in the field that activities will need to occur during the breeding season in potentially suitable habitat (i.e. tamarisk), authorization must be received from the contractor (MACTEC–ERS) and DOE National Environmental Policy Act staff. Avoidance and/or mitigation measures (i.e. habitat or species surveys) may be required.

State of Utah Well Installation Regulations—In the event that permanent piezometers need to be installed in the area of investigation notice or permitting with the State of Utah is not required. Also, temporary or permanent wells less than 30 ft. will not require notice or permitting with the State of Utah. Monitor wells installed greater than 30-ft in depth will require notice and permitting with the State of Utah.

Waste Management/Brine Effluent—The area where the brine testing is planned was scanned during the Phase I field work for the presence of surface radiological contamination and found to exceed the Uranium Mill Tailings Remedial Action surface remediation standard of 5 picocuries per gram above background. For this reason, both solid and liquid investigation-derived waste can be disbursed in the contaminated area around the well during the Phase II fieldwork.

Groundwater effluent from the step-tests will be discharged to the ground surface in around the pumping well. Groundwater effluent from the low-flow test (up to 5 gpm) will be either discharged to the ground surface in an area around the pumping well or spray evaporated in the area around the pumping well. Groundwater effluent from the high-flow test (greater than 5 gpm) will be either spray evaporated in the area around the pumping well, or if spray evaporation is not effective the groundwater effluent will be discharged to the evaporation pond located on top of the tailings pile. In any event solid and liquid investigation-derived waste (i.e. brine waters) will be retained on-site in existing contaminated areas.

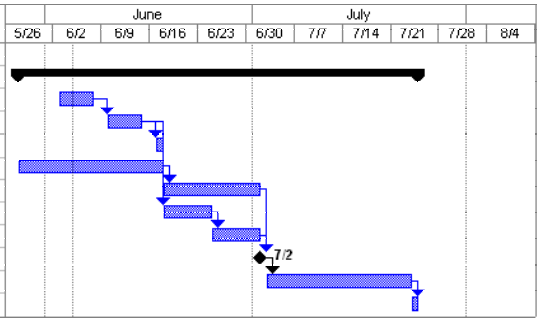
IV. Health and Safety

The site-specific Health and Safety Plan (DOE 2001) has been prepared for the Moab Project in accordance with the requirements of 29 CFR 1910.120. All fieldwork will be performed according to the site-specific health and safety requirements developed for this task (DOE 2001).

V. Schedule

A general schedule is presented below. It should be noted that this schedule assumes that the existing well (PZ1S) is suitable for conducting the low-flow test. A decision point to determine the need for a new pumping well is scheduled after preliminary data from the low-flow test is evaluated.

ID	Task Name	Duration	Start	Finish
1				
2	**Long-Term Brine Test**	**42 days**	**Tue 5/28/02**	**Wed 7/24/02**
3	Prepare Addendum to work plan	5 days	Mon 6/3/02	Fri 6/7/02
4	DOE Review	5 days	Mon 6/10/02	Fri 6/14/02
5	Incorporate Comments	1 day	Mon 6/17/02	Mon 6/17/02
6	NEPA Documentation	15 days	Tue 5/28/02	Mon 6/17/02
7	Install Power Line	10 days	Tue 6/18/02	Mon 7/1/02
8	Step-Test in Existing Well	5 days	Tue 6/18/02	Mon 6/24/02
9	Install Observation Well/Geoprobe	5 days	Tue 6/25/02	Mon 7/1/02
10	Initiate Low-Flow Test	1 day	Tue 7/2/02	Tue 7/2/02
11	Evaluate Preliminary Data	15 days	Wed 7/3/02	Tue 7/23/02
12	Determine Need for New Pumping Well	1 day	Wed 7/24/02	Wed 7/24/02



ADDENDUM A

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